DESIGN AND IMPLEMENTATION OF AN INTEGRATED INFORMATION SYSTEM FOR KOREAN WOMEN'S EDUCATION PROGRAMS

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ABSTRACT
Modern middle-aged women, called “Gold queens” or “the Ruby tribe”, have the ability to invest positively in themselves, unlike previous generations that could only invest in their families. Consequently, the need for self-development and re-employment has rapidly increased to meet the needs of middle-aged women in society. Thus, to meet these needs, the Korean government develops and provides various educational programs for middle-aged women. However, organization of these programs is lacking and an integrated management system is yet to be developed. In this paper, we propose an integrated system to manage and compare the available information on the educational program services for middle-aged women.

KEY WORDS
Mobile Application, Integrated Service, Social Service, Service Engineering

1. Introduction
Recently, the career discontinuity of women has become a serious social problem due to marriage and childcare in Korea. According to employment statistics from 2012 provided by Statistics Korea, the 25-29 year-old segment has the highest participation in the female labor market [1][2]. Participation by the 30-39 year-old segment decreases to 56.4%(20.3% of married women). The causes of career discontinuity are marriage (46.9%), childcare (24.9%), and pregnancy and delivery (24.2%)[1][2]. Because women want to resume careers that were disrupted after marriage, the employment rate of the over-40 year-old segment is 64.3%, which is higher than the 30-39 year-old segment[1].

Being liberated from housework and child education, housewives in their 40s tend to have more time to spare both physically and mentally and become more interested in self-development. They are also interested in various education programs to fulfill learning desires that remain unsatisfied. Therefore, local government departments such as the Seoul Women Development Institute[3] provide educational programs for employment and career development to increase women’s competitiveness. However, information on these programs are not integrated or properly managed because different departments are involved.

In this paper, we proposed a mobile application that provides integrated information on various women’s education programs for ease of comparison and access to the programs on the Android environment.

2. Related Works

2.1 Seoul Women Development Institute
Since this website only provides information on the Seoul Women Development Institute, it is difficult for users to obtain information on other development centers. Furthermore, courses must be searched for individually due to the limited search function for course names. Therefore, we intend to include search functions for organization, period, and course. In addition, more course information can be provided for users who download the application program interface (API) from each local government organization such as Jungbu, Jungrang, Songpa and the Seoul Women Development Institute.

2.2 OpenAPI
There is a new kind of public sector organization emerging : Open government[4]. This is government that opens its doors to the world[4]. The Open API is one of its efforts. Open API refers to an API that is freely available to the public and can be used by anyone [5]. The proposed system uses the Open API provided by the Seoul City Open Data Plaza[6] to fetch information on education programs. After API authentication, information such as the location of organizations, the number of recruitment opportunities, tuition fees, and the starting and ending dates for classes are provided in the Extensible Markup Language (XML)[7] format and JavaScript Standard Object Notation (JSON)[8]. Because the proposed system uses XML and JSON, the data can be accessed quickly and effectively. Additionally, the location data is connected to the Naver Map API[9] to provide location information to users.

Seoul City Open API[6] is an interface open to developers to facilitate easier use of Seoul City services and data. By using this Open API, a creative application that combines various services can be developed. This service, which includes features such as the Open Data Plaza, makes public information openly available and...
facilitates communication with the public to increase public benefits, work efficiency, and transparency. It also intends to create new services and public value through voluntary participation of citizens.

3. Proposed System

In this paper, we used the Android platform version 4.0.3 (Ice Cream Sandwich) and software development kit (SDK) to implement the proposed mobile application. We also designed the system structure as shown in Figure 1.

Users can access the target system through their smartphones. The application server receives the API from the server that provides the respective API, converts the XML data into the JSON format, and then sends it to the application (smartphone). The JSON objects are parsed into the posted date, course name, and description, and sent to users in an intuitive UI.

3.1. Performance improvement of Android ListView

ListView receives the position and view of the target list through the getView() function at an Adapter and displays the list on the screen. Thus, whenever the list is scrolled, the ListView calls the getView() function to request new views to display, and by reusing previously used views instead of repeatedly calling getView, the views can be displayed more quickly. For this, convertView, which is the second parameter in the getView() function, is used. convertView displays the views of items created and returned to fill previous screens. If the data is set to be reused, the inflate process does not need to be repeated.

The second method is to use a ViewHolder pattern. We access views through the findViewById function, but it is a costly operation in Android. As an alternative, the ViewHolder pattern is used. The ViewHolder method establishes the data without performing an operation like findViewById by specifying the location of the established data in advance. By using a combination of convertView and ViewHolder patterns, the overall speed can be improved.

3.2. 9-Patch Image

In order to present messages between course members, we use a 9-Patch[10] image. A 9-Patch image refers to a processed image that enables output of a large image as a small image without distortion of the external image by adding data to control the scale in the 9-patch space.

Figure 2 shows how the 9-patch is applied. The scalable area is a 9-patch area that sets the scale for
stretching the image, and the fill area defines the content and its position on the image.

In Figure 2, you can see the image scaled horizontally, with the center area stretched while the circular sides remain undistorted. If you apply an icon after specifying the stretchable portion of the image, only the specified portion will be stretched when you need a large image. This technique was applied to the bulletin boards of each education center.

3.3. Internal process of Server

Figure 3 shows the system operation method. The XML parsing module is optimized for each page. When the XML is received, it separates and saves the course information, organization name, and date in the JSON format and then sends them to the user. Basically, the XML parsing module is implemented for the API, and in addition, the location information is fetched using the Naver Map OpenAPI.

Figure 3. Dataflow diagram in Server

In order to manage several types of information on the proposed system, we decided to use both MySQL[11] and SQLite database systems[12]. While SQLite is a database management system like MySQL, it is a relatively lightweight embedded database used in offline application programs instead of servers. Compared to a regular relational database management system (RDBMS), it is not appropriate for large-scale operations, but is frequently used for small- to medium-scale operations.

MySQL is an open-source RDBMS. To access a MySQL database, APIs in several programming languages can be used. However, it does not allow direct access from Android, the data is transferred using technologies such as PHP, XML, and JSON.

3.4. Execution of Proposed System

Figure 4 is a screenshot showing the implementation of an actual application with the system proposed in this paper. It provides the location information for the organization offering the education courses and supports the corresponding location map in the application. Furthermore, it provides a function for registering for courses that users are interested in and manages the course descriptions in the DB.

Figure 4. Execution image for mobile application (in Korean)

In this paper, we use two types of databases for data management. First, SQLite is used as an embedded database to manage the course data added to bookmarks. Since the volume of data managed in the bookmarks was not great and the DB configuration was simple, SQLite, which is also included in the Android SDK, was considered appropriate for the purpose. Furthermore, in order to facilitate information exchange between users, MySQL was used to manage the conversation content. MySQL was used to manage information exchange bulletin boards for five different organizations and save the data even when the application is uninstalled. Since Android is not directly connected to MySQL, PHP is used to pass and save the data.

4. Conclusion

This paper proposes several techniques for developing an application to provide information on education programs for middle-aged women based on existing studies.
Through the Open API provided by the Seoul Human Resource Development Center, the desired information is parsed and converted to the JSON format then provided to the application. The system structure was designed to enable users to search through the information easily, and location information is provided using Naver Maps. Additionally, a bulletin board function by organization was implemented using the Web server to facilitate the exchange of opinions between users. At present, each organization provides information only on its respective Website, and thus, providing aggregated education information for various centers is a differentiation factor for the proposed system.

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